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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Nicolaas B. ROOZEN, et al.	)	Examiner: VARGAS, Dixomara
Serial No.: 10/557,757	)	Art Unit: 2859
Filed: November 18, 2005	)	Confirmation: 1566
For: **MAGNETIC RESONANCE IMAGING DEVICE WITH SOUND-ABSORBING MEANS**	)	
Date of Last Office Action August 24, 2007	)	
Attorney Docket: PHNL030571US / PKRZ 2 01280	)	Cleveland, Ohio 44114 February 14, 2008

APPEAL BRIEF

Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is an Appeal from the Final Rejection of August 24, 2007.

The Notice of Appeal and fees were filed December 19, 2007.

The Appeal Brief submission fee in the amount of $ 510.00 is enclosed.

CERTIFICATE OF ELECTRONIC TRANSMISSION

I certify that this Appeal Brief and accompanying documents in connection with U.S. Serial No. 10/557,757 are being filed on the date indicated below by electronic transmission with the United States Patent and Trademark Office via the electronic filing system (EFS-Web).

February 15, 2008
Date

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TABLE OF CONTENTS

Page

I. REAL PARTY IN INTEREST 1
II. RELATED APPEALS AND INTERFERENCES 2
III. STATUS OF CLAIMS 3
IV. STATUS OF AMENDMENTS 4
V. SUMMARY OF CLAIMED SUBJECT MATTER 5
VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL 7
VII. ARGUMENT 8
  A. The References of Record 8
  B. Claims 1, 2, 4, and 14-16 are Patentable over Dean in Combination with Alphand 9
    1. Claim 1 is patentable over Dean in view of Alphand 9
    2. Claim 2 is patentable over Dean in view of Alphand 10
    3. Claim 14 Distinguishes Patentably over Dean in view of Alphand 10
    4. Claim 15 Distinguishes Patentably over Dean in View of Alphand 10
    5. Claim 16 Distinguishes Patentably over Dean in view of Alphand 11
  C. Claim 19 Distinguishes Patentably over Dean in view of Ham 11
  D. Conclusion 12
VIII. CLAIMS APPENDIX 13
IX. EVIDENCE APPENDIX 16
X. RELATED PROCEEDINGS APPENDIX 17

I. REAL PARTY IN INTEREST

The Real Party in Interest is the Assignee, KONINKLIJKE PHILIPS ELECTRONICS, N.V.

II. RELATED APPEALS AND INTERFERENCES

There are no related Appeals or Interferences.

III. STATUS OF CLAIMS

Claims 1, 2, and 4-19 are pending.

Claim 3 has been cancelled.

Claims 1, 2, 4, 14-16, and 19 are rejected.

Claims 5-13, 17, and 18 were found allowable over the prior art.

The rejection of claims 1, 2, 4, 14-16, and 19 is being appealed.

IV. STATUS OF AMENDMENTS

No Amendments After Final have been filed.

There are no outstanding Amendments which have not been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Regarding antecedent basis for the subject matter of claim 1, the present application discloses a magnetic resonance imaging (MRI) device 1, 20, which includes a diagnostic space 5, 25, a main magnet system 2, 22, for generating a main magnetic field in the diagnostic space, a gradient magnetic coil system 3, 23, comprising a gradient coil for generating at least one gradient of the main magnetic field (page 6, line 28 – page 7, line 15; page 8, lines 10-23; Figures 1 and 3a). A noise-reducing means which reduces noise that is generated as the result of vibrations of the gradient coil 3, 23, includes a sound-absorbing panel 6, 29, disposed between the gradient coil 3, 23, and the diagnostic space 5, 25. The sound-absorbing panel 6, 29 includes channels 8, 18 having an open end and a closed end (page 7, lines 16-25; page 8, line 24 – page 9, line 28; Figures 1 and 3a).

Regarding claim 2, the sound-absorbing panel 6, has an absorption coefficient on the order of 0.5 or more, preferably in the order of at least 0.75 dB for at least part of the frequency range between 20 Hz and 4000 Hz (page 7, lines 13-16).

Regarding claim 4, the channels 8, 18 extend at least substantially in a direction parallel to the direction of the diagnostic space 5, 25 and the gradient coil 3, 23 (page 3, lines 3-10; page 7, line 32 – page 8, line 9; Figure 2).

Regarding claim 14, the sound-absorbing panel 6, 29 is provided with a radio frequency transmission coil system 7, 14, 24, 27, 28, for generating and/or receiving a radio frequency signal in the diagnostic space (page 7, line 32 – page 9, line 12; Figures 2, 3a, 3b, and 3c).

Regarding claim 15, the radio frequency transmission coil system includes an electrically-conducting winding 14, 27, 28, which extends at least in part between at least some of the channels 8, 18, (page 7, line 32 – page 8, line 9; Figures 2-3c).

Regarding claim 16, the radio frequency transmission coil system includes at least one electrically conductive layer 27 with which the sound-absorbing panel 29 is coated on the side of the diagnostic space and in which openings are present at the location of an open end of the channels 8, 18, that may be present on the side of the diagnostic space 5, 25 (page 8, line 10 – page 9, line 18; Figures 3a, 3b, 3c).

Regarding claim 19, the present application discloses a magnetic resonance imaging (MRI) device 1, 20, which includes a diagnostic space 5, 25, a main magnet system 2, 22, for generating a main magnetic field in the diagnostic space, a gradient magnetic coil system 3, 23, comprising a gradient coil for generating at least one gradient of the main magnetic field

(page 6, line 28 – page 7, line 15; page 8, lines 10-23; Figures 1 and 3a). A noise-reducing means includes a sound-absorbing panel 6, 29, disposed between the gradient coil and the diagnostic space. The sound-absorbing panel includes glass wool (page 10, lines 12-16; Figures 1 and 3a).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1, 2, 4, and 14-16 are patentable over Dean (US 6,414,489) in view of Alphand (FR 2,833,281).

Whether claim 19 is patentable over Dean in view of Ham (US 6,628,117).

VII. ARGUMENT

A. The References of Record

Dean is directed to an MRI device which includes a main magnet 10, a gradient coil 18, and an RF coil 20. Disposed within the bore 12a, 12b is a platform 28 which supports the patient pallet when it moves into the bore.

An apparatus 30 includes an inner fiber-glass reinforced plastic layer 34 which is covered with a layer of open-cell foam 36 (column 3, lines 52-65). A layer of rubber 38 lines the bottom edges of the apparatus 30 and double-stick Teflon tape 40 adheres the apparatus 30 to the bridge 38 (column 4, lines 23-34).

The apparatus 30 is constructed to provide clearance between the open-cell foam layer 36 and the wall of the bore 12b which is sufficient to allow the apparatus 30 to be easily inserted into and removed from the bore (column 4, lines 7-10).

Alphand discloses panels 1 configured of molded or pressed concrete, which concrete includes wood particles among its other constituents (page 4, lines 34-35). The panels are used along highways and railroad transportation routes (page 4, lines 20-22). These panels can be used to coat the front of a building (page 1, lines 6-7) or can be mounted to a reinforced concrete- structure 10. The panels 1 are mounted on the face of the structure 10 which faces toward the sound source (page 6, lines 19-21). The volume 8 can receive a fibrous sound-absorbing material 9 (page 6, lines 13-17).

These panels are then mounted to the wall or carrying structure 10 with the openings to the volumes 8 facing the wall or structure 10 and the face 6 which has no openings facing the direction of the sound source (page 5, lines 17-21). As shown in Figures 4 and 5, the panels 1 are mounted alternately with conventional concrete panels (page 8, lines 34-36). With this construction, an attenuation coefficient of 0.7 to 0.9 is achieved for a band between 200-400 Hz (page 7, lines 16-17).

Ham teaches that a foam material 16 containing heavy-duty components should be placed outside of the diagnostic space 2, particularly outside of the main magnetic field coil 3 and its cryostat 4. Ham concedes that glass wool is possible [0022]. Of course, the gradient coils and RF coils are disposed between the main magnets 3 and its cryostat 4, and the diagnostic space 2. Thus, Ham teaches that if one is to use glass wool, it should be placed outside of the MRI machine away from the patient and adjacent the floor 12.

For the reasons set forth below, it is submitted that there is no motivation to insert the concrete vehicle or train sound-damping panels Alphand into the bore of an MRI machine, nor is there any motivation to move the glass wool panel 16 of Ham from the floor into the bore of an MRI machine adjacent the patient.

B. Claims 1, 2, 4, and 14-16 are Patentable over Dean in Combination with Alphand

1. Claim 1 is patentable over Dean in view of Alphand

First, it is submitted that those of ordinary skill in the magnetic resonance arts would not be motivated to or find it obvious to use the concrete sound-damping panels of Alphand within the bore of a magnetic resonance imaging machine.

Second, claim 1 calls for the channels to have an open end and a closed end. In Alphand, the panels 1 are mounted with the peripheral edge 2 against the wall or carrying structure 10 (Alphand, page 5, lines 23-25). Thus, the collar 5 portion of the cavity 7 is closed by the concrete wall or structure 10, that is, the large end of cavity 7 is mounted facing the wall or carrying structure 10 and is effectively closed by the peripheral molding 2.

Third, claim 1 calls for the sound-absorbing panel to be disposed between the gradient coil and the diagnostic space. By contrast, Dean requires that the apparatus 30 be placed in the diagnostic space. Specifically, as enunciated in column 4, lines 7-10 of Dean, the outer surface of the layer 36 is spaced from the wall which defines the central bore 12b. That is, Dean requires the acoustic apparatus 30 to be positioned **in** the diagnostic space. This is highly disadvantageous in that the apparatus 30 of Dean reduces the bore size of the magnetic resonance imaging system, making the system more claustrophobic and limiting the size of the patient which can be fit into the MRI system. To make the inside diameter of the apparatus 30 as large as the original bore 12b, one would have to make the RF coils, gradient coils, main magnet, and cryostat larger in diameter, in a very-expensive proposition. Thus, contrary to claim 1, which calls for the sound-absorbing panel to be **between** the gradient coil and the diagnostic space, and Dean requires apparatus 30 to be disposed **within** the diagnostic space. Alphand neither addresses nor cures this shortcoming of Dean.

Finally, the Final Office Action fails to set forth any rationale or argument as to why those of ordinary skill in the MRI art would find it obvious to incorporate the concrete road noise suppressing panel construction of Alphand into an MRI scanner. The Examiner

provides no explanation or rationale to support her assumption that such a combination would be "obvious to one of ordinary skill in the art".

For the reasons set forth above, it is submitted that claim 1 and claims 2, 4, and 14-16 dependent therefrom, distinguish patentably and unobviously over Dean in view of Alphand and the other references of record.

2. Claim 2 is patentable over Dean in view of Alphand

Claim 2 is concerned with attenuating acoustic noise with frequencies of about 20-4000 Hz. By contrast, Alphand is concerned with the attenuation of road noise in the 200-400 Hz range (page 7, line 17).

3. Claim 14 Distinguishes Patentably over Dean in view of Alphand

Claim 14 calls for the sound-absorbing panel to be provided with a radio frequency transmission coil system for generating or receiving a radio frequency signal. By contrast, Dean calls for the RF coil 20 to be well-displaced and away from the acoustic energy-absorbing material 36. In addition to the undisclosed structure between the RF coil 20 and the bore 12, an annular portion 12a of the bore is also disposed between the RF coil and the acoustic energy-absorbing material 36. Dean specifically calls for the foam 36 to be spaced from the circumference of the bore (column 4, lines 23-34). Thus, the acoustic energy-absorbing material 36 of Dean is not provided with a radio frequency transmission coil system. Alphand fails to cure this shortcoming of Dean. Alphand makes no suggestion of embedding RF transmission or reception coils in the concrete barriers. Accordingly, it is submitted that claim 14 and claims 15-16 dependent therefrom distinguish patentably and unobviously over the references of record.

4. Claim 15 Distinguishes Patentably over Dean in View of Alphand

Claim 15 calls for the radio frequency transmission coils to include an electrically conductive winding which extends in part between some of the channels. By contrast, in Dean, the RF coils 20 are well displaced from the acoustic energy-absorbing material with an air gap 12a in between. The windings do not extend through the acoustic energy-absorbing material 36. Alphand fails to cure this shortcoming. Alphand makes no suggestion of placing RF coil windings through the concrete between the channels.

5. Claim 16 Distinguishes Patentably over Dean in view of Alphand

Claim 16 calls for the sound-absorbing panel to be coated on the side of the diagnostic space with an electrically conductive layer of the radio frequency transmission coil system. By contrast, Dean places the transmission coil on the side of the sound absorbing material away from the diagnostic space and spaces the RF coil and the acoustic energy-absorbing material apart. Alphand fails to cure this shortcoming of Dean. Alphand fails to suggest an RF coil system including an electrically-conductive layer on the surface of the concrete barrier structure. Accordingly, it is submitted that claim 16 distinguishes patentably and unobviously over the references of record.

C. Claim 19 Distinguishes Patentably over Dean in view of Ham

Claim 19 calls for a noise-reducing means that includes a sound-absorbing panel disposed between the gradient coil and the diagnostic space, which sound-absorbing panel includes glass wool. Although Ham does show that glass wool is a known material, Ham discloses that the noise-absorbing material 16 should be disposed not only outside the bore, but also outside of the main magnet and its cryostat ([0022]; Figure 3). Ham provides no motivation to put glass wool inside the bore, i.e., in the patient imaging region of a diagnostic scanner. Further, it is submitted that those of ordinary skill in the art would not be motivated to place glass wool close to patients. Glass wool tends to generate glass fiber dust which can lodge in the lungs and be highly injurious to a human which breathes such dust. When glass wool insulation is installed, the installer is strongly warned to wear a protective breathing mask, and use gloves. Accordingly, it is submitted that those of ordinary skill in the art viewing Dean and Ham would not be motivated to place glass wool insulation in the patient-receiving area of the magnetic resonance imaging system of Dean.

D. Conclusion

For the reasons set forth above, it is submitted that claims 1-19 all distinguish patentably and unobviously over the references of record. An early reversal of the Examiner's rejections is requested.

Respectfully submitted,

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APPENDICES

VIII. CLAIMS APPENDIX

Claims involved in the Appeal are as follows:

1. A magnetic resonance imaging (MRI) device, comprising a diagnostic space, a main magnetic system for generating a main magnetic field in said diagnostic space, a gradient magnetic coil system comprising a gradient coil for generating at least one gradient of the main magnetic field, and noise reducing means for reducing noise that is generated as a result of vibrations of the gradient coil, wherein the noise reducing means comprise a sound-absorbing panel disposed between the gradient coil and the diagnostic space wherein the sound-absorbing panel comprises channels having an open end and a closed end.

2. A magnetic resonance imaging (MRI) device according to claim 1, wherein the sound-absorbing panel has an absorption coefficient in the order of at least 0.5, more preferably in the order of at least 0.75 dB for at least part of the frequency range between 20 Hz and 4000 Hz.

3. (Cancelled)

4. A magnetic resonance imaging (MRI) device according to claim 1, wherein said channels extend at least substantially in a direction parallel to the direction between the diagnostic space and the gradient coil.

5. A magnetic resonance imaging (MRI) device according to claim 1, wherein the channels extend at least substantially perpendicularly to the direction between the diagnostic space and the gradient coil, at least on the side of their closed ends.

6. A magnetic resonance imaging (MRI) device according to claim 1, wherein the open ends of at least some of the channels are present on the side of the associated channels that faces towards the diagnostic space.

7. A magnetic resonance imaging (MRI) device according to claim 1, wherein the open ends of at least some of the channels are present on the side of the associated channels that faces towards the gradient coil.

8. A magnetic resonance imaging (MRI) device according to claim 1, wherein the cross dimension of at least a part of the channels on the side of the associated open ends is maximally 15 mm, preferably maximally 10 mm.

9. A magnetic resonance imaging (MRI) device according to claim 1, wherein the cross dimension of at least a part of the channels on the side of the associated closed ends thereof is different from a cross dimension of the part of the channels on the side of the associated open ends.

10. A magnetic resonance imaging (MRI) device according to claim 9, wherein the cross dimension of the part of the channels on the side of the associated closed ends is larger than a cross dimension of the part of the channels present on the side of the associated open ends.

11. A magnetic resonance imaging (MRI) device according to claim 10, wherein the proportion between the cross dimension of the part of the channels on the side of the associated closed ends and the cross dimension of the part of the channels on the side of the associated open ends is at least in the order of 2.5, preferably at least in the order of 4.0.

12. A magnetic resonance imaging (MRI) device according to claim 1, wherein the minimum spacing between adjacent channels at the location of the associated maximum cross dimension of the adjacent channels is maximally 50% of the sum of the associated maximum cross dimensions, preferably maximally 35% of the sum of the associated maximum cross dimensions.

13. A magnetic resonance imaging (MRI) device according to claim 1, wherein the dimensions of the channels of the sound-absorbing panel are mutually different.

14. A magnetic resonance imaging (MRI) device according to claim 1, wherein the sound-absorbing panel is provided with a radio frequency transmission coil system for generating and/or receiving a radio frequency signal in the diagnostic space.

15. A magnetic resonance imaging (MRI) device according to claim 14, wherein the radio frequency transmission coil system comprises an electrically conductive winding which extends at least in part between at least some of the channels.

16. A magnetic resonance imaging (MRI) device according to claim 14, wherein the radio frequency transmission coil system comprises at least one electrically conductive layer, with which the sound-absorbing panel is coated on the side of the diagnostic space and in which openings are present at the location of any open ends of the channels that may be present on the side of the diagnostic space.

17. A magnetic resonance imaging (MRI) device according to claim 1, wherein the sound-absorbing panel is built up of a number of abutting, preferably glued-together subpanels.

18. A magnetic resonance imaging (MRI) device according to claim 1, wherein the sound-absorbing panel is coated between the open ends with a sound-absorbing material having an absorption coefficient of at least 0.5 for at least part of the frequency range between 20 Hz and 4000 Hz.

19. A magnetic resonance imaging (MRI) device comprising a diagnostic space, a main magnetic system for generating a main magnetic field in said diagnostic space, a gradient magnetic coil system comprising a gradient coil for generating at least one gradient of the main magnetic field, and noise reducing means for reducing noise that is generated as a result of vibrations of the gradient coil, wherein the noise reducing means comprise a sound-absorbing panel disposed between the gradient coil and the diagnostic space wherein said sound-absorbing panel comprises glass wool.

IX. EVIDENCE APPENDIX

None

X. RELATED PROCEEDINGS APPENDIX

None